

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Award Number: W81XWH-11-2-0100

Proposal #10071010

TITLE: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PRINCIPAL INVESTIGATOR: David Rubin, MD, MSCE

CONTRACTING ORGANIZATION: The Children's Hospital of Philadelphia
Philadelphia, PA 19104

REPORT DATE: March 2016

TYPE OF REPORT: Annual Report

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE March 2016	2. REPORT TYPE Annual		3. DATES COVERED 18 Feb 2015 -17 Feb 2016		
4. TITLE AND SUBTITLE The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members			5a. CONTRACT NUMBER W81XWH-11-2-0100		
			5b. GRANT NUMBER 10071010		
			5c. PROGRAM ELEMENT NUMBER		
			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
6. AUTHOR(S) David M Rubin, MD, MSCE- Principal Investigator Christine Taylor- Project Coordinator email: rubin@email.chop.edu			8. PERFORMING ORGANIZATION REPORT		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Children's Hospital of Philadelphia 34 th Street and Civic Center Boulevard CHOP North- Suite 1500 Philadelphia, PA 19104					
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S NUMBER(S)		
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release, Distribution Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Prior research has established an association between deployment and family violence, with insufficient evidence to identify when such violence occurs in relation to deployment and identification of mental illness in ADSM. This project used longitudinal models to capture the temporal relationships between deployment, mental illness and family violence. We have progressed through formal analysis to answer our research questions. We have published one manuscript in the past year, and are currently drafting four (4) additional manuscripts. We have executed one 6 month NCE, and have a second pending approval.					
15. SUBJECT TERMS Family violence, mental illness, health services research					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION UU	18. NUMBER 11	19a. NAME OF RESPONSIBLE PERSON USAMRMC
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (include area code)

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

Table of Contents

	<u>Page</u>
1. Introduction.....	4
2. Keywords.....	5
3. Summary of Progress.....	5
Key Personnel	
Human Subjects Approval	
Key Partnerships	
Data Acquisition	
Enhancing our security standards	
Data Preparation and Analysis	
Research Accomplishments	
5. Conclusions	6
6. Changes/Problem Areas.....	8
8. Products: Publications, Abstracts, Presentations.....	8
9. Upcoming Work	9
10. References.....	10

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 4

CLINICAL RESEARCH ANNUAL TECHNICAL PROGRESS REPORT (USAMRAA)

(a) Grant/Cooperative Agreement number and title

Proposal #10071010; Contract #: W81XWH-11-2-0100

Proposal Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

(b) Type of report, sequence number of report, and period of performance being reported

Annual Report #4 (Q1-Q4 of Y5/6), February 18, 2015 to February 17, 2016

(c) Recipient's name, address, and telephone number

Brigit M. Ciccarello, M.A.

Science Officer

Research Program Officer,

The Geneva Foundation in support of Congressionally Directed Medical Research Programs

U.S. Army Medical Research & Materiel Command

(410) 608-6905

(d) Principal Investigator name, address and telephone number

David Rubin, MD, MSCE

The Children's Hospital of Philadelphia

PolicyLab

3535 Market Street, 15th Floor

Philadelphia, PA 19104

(215) 590-3815

(e) Date of publication

March 18th, 2016

(f) Grants Officer's Representative name

Lance Nowell

SECTION I - INTRODUCTION

The last decade has been one of considerable stress to families of soldiers, who have sustained a 10-year combat effort involving prolonged, sequential deployments. The resulting deployment tempo created unique stressors on military families. While evidence suggests that military families themselves are not at increased risk for intrafamilial violence during peacetime, there is evidence that: (1) cycles of deployment may increase this risk; (2) this risk could be encumbered by the soldiers themselves, or by the spouse who is left behind to care for the family's needs; and (3) while prior data has demonstrated a cross-sectional association between deployment and intrafamilial violence, there remains a great need to understand the temporal relationships, the specific personnel at greatest risk, and how such information can lead to better targeting of preventative resources.

This proposal offers a mixed methods approach to better appreciate the challenges faced by military families, as well as potential strategies that will support them and thereby reduce the risk for intrafamilial violence that may be associated with deployment. An observational analysis (Stage 1) will determine the temporal relationships between deployment, mental health issues, and intrafamilial violence within military families, and evaluate the risk differences between soldiers with different roles and responsibilities. To be clear, this proposal does not seek to identify whether there is an association between deployment and intrafamilial violence. Rather, we will further advance the military's understanding of this association by identifying the temporal relationships between deployment and intrafamilial violence as well as discovering how other factors mediate and moderate this relationship. With this analysis, we can identify specific subgroups of families that are at greatest risk for intrafamilial violence and the timeframe in which their risk is greatest. In this way, policies within the Army can help to target resources more effectively to families at highest risk, moving away from a "one-size fits all" approach.

For the observational analysis, we will link personnel and deployment history with healthcare claims data and substantiated reports of spousal and child abuse. The team will pursue longitudinal analyses to:

- 1) Establish the temporal relationship between deployment, diagnosis of mental illness in soldiers and spouses, and events of intrafamilial violence.
- 2) Identify specific factors that may modify the temporal relationship, including individual factors (i.e., demographics, soldiers' prior health, unit, MOS), family factors (i.e., family size, compositing, family members' prior health history), and deployment factors (i.e. length, frequency, timing between, and role during)

To build upon those results, the team will then pursue a community-driven approach via qualitative study (Stage 2) in which targeted leadership and stakeholders within the Army will be asked to reflect on the results from the observational study, based on expertise and past experiences within the system, to provide structured feedback that will guide suggestions for future interventions. This mixed methods format offers the best approach to linking quantitative analyses with concrete stakeholder recommendations in order to develop appropriate interventions that can be feasibly implemented. For the qualitative study, we will create a structured qualitative approach that will emerge from Stage 1 findings and, with guidance from our Army advisors, which allows community experts/stakeholders from within the Army to:

- 1) Provide a rich contextual interpretation of the findings generated in Stage 1.

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 6

- 2) Solicit recommendations from Army stakeholders that will enhance the successful implementation of future interventions arising from Stage 1 findings.

SECTION II- KEYWORDS

Keywords

Child maltreatment, deployment, Family Advocacy Program, child abuse, family violence, mental health, reporting

SECTION III - SUMMARY OF PROGRESS

Personnel

None

Human Subjects Approvals

The study team submitted and received approval from the CHOP IRB for the annual continuing review of the protocol. Additionally, we received Continuing Review approval from the USAMRMC ORP HRPO.

Key Partnerships

Over the past year, we have strengthened our existing partnerships with the Family Advocacy Program. The individuals we have worked with have contributed a breadth of knowledge regarding the data, content, and results. They have greatly added to the value and direction of the study. Specifically, from the Department of Defense Family Advocacy Program, Kathy Robertson has invited our group to speak to colleagues and key personnel as we together best think about how to help children of Army families. Dr. Rene Robichaux of the Army Family Advocacy Program has been an integral part of the team success as he guided us through the analysis phase. In addition, key partners across the Presidential Commission to Eliminate Child Abuse and Neglect Fatalities have been instrumental as our group remains in the conversation surrounding child abuse broadly. They add valuable input surrounding general reporting processes and policy relevant discussion. The team will continue to build and strengthen our relationships as we finish analyses and disseminate.

Enhancing our security standards

No modifications to our security standards have been made.

Data Acquisition

None.

Data Preparation and Analysis

1. Deployment Hazards Analysis

This year we completed an analysis including children younger than 24 months of age, a population considered at highest risk for severe injury and fatality from child maltreatment. We restricted to population to this age group to reduce heterogeneity in age related child maltreatment episodes across the deployment cycle. We selected children of soldiers with one deployment during the study period. The primary outcome of interest for this analysis was a child maltreatment episode. We considered child maltreatment episodes arising from two separate sources: (1) substantiated child maltreatment reports from FAP and (2) medical diagnoses of child maltreatment (based on International Classification of Diseases, Ninth Revision, Clinical

Modification, 22 codes) from TRICARE medical records—the same algorithm used in previous analyses (Taylor et. al, 2015). Exposures of interest were predefined time periods relative to a soldier's deployment. The observation window was divided into the following 5 periods: (1) 7 or more months pre deployment (time before a deployment begins), (2) 0 to 6 months pre deployment, (3) during deployment, (4) 0 to 6 months post deployment (time after a deployment ends), and (5) 7 or more months post deployment. Additional sponsor covariates included rank (enlisted or officer/warrant), education (less than high school, high school degree, some college, college degree or more), and race/ethnicity (white, black, Hispanic, American Indian/Alaskan native, Asian/pacific islander, or other). Child covariates included year of birth and premature birth (yes/no). We used cox proportional hazard models to estimate the hazard of maltreatment by deployment period. Right censoring occurred when 1) the child experienced a maltreatment event, 2) the child aged to 25 months, or 3) the study period was over (2007). Because maltreatment may be different based on sponsor gender, models were analyzed separated by male and female sponsors.

2. Soldier Mental Health Analyses

The team is simultaneously pursuing two separate mental health analyses. Initially, we conducted a Kaplan-Meier curve of post-deployment mental health diagnoses for soldiers. The KM curve showed the time until diagnoses following deployment. To compliment the longitudinal analysis, we are also currently conducting descriptive analyses focusing on mental health diagnoses and prescriptions made in the months surrounding abuse events during the post-deployment periods. Therefore, the team is presently drafting two manuscripts. Firstly, to identify risk factors for PTSD diagnoses made in the post-deployment period among soldiers deployed once during the study period. Secondly, to identify patterns of mental health diagnoses and prescription drug patterns among all soldiers deployed at least once during the study period.

3. Child Maltreatment Reporting

Over the past year, the team re-conducted an earlier linkage analysis. Following an algorithm revision, all analysis datasets were updated and relinked. Using the updated dataset, we completed a revised analysis of the relationship between child maltreatment events and reports to the Family Advocacy program, and found the same results.

SECTION IV - CONCLUSIONS

1. Deployment Hazards Analysis

From 2001 to 2007, 73,404 children were born to 56,087 soldiers who were deployed one time during the observation period. Among all soldiers included in our sample, 90.8% were male. Among soldiers associated with an episode of TRICARE or FAP maltreatment, 87.3% were male. Compared to the overall study population of soldiers, those associated with maltreatment were more likely to be Non-Hispanic White (61.7%) or Non-Hispanic Black (25.5%), and less likely to be Hispanic (8.1%). During the study period, 647 (0.9%) children of age 0-24 months were identified in either a FAP report or in a TRICARE medical diagnosis as having experienced maltreatment. Of children with a maltreatment experience, 3.9% were born with a neonatal complex chronic condition, compared to 1.9% of the general population.

Adjusting for static and time-varying covariates in Cox proportional hazard regression models, the hazard rate for children with male soldiers was 0.59 times that of female soldiers ($p < 0.001$). The children of soldiers with a mental health diagnosis or prescription prior to their birth experienced a hazard rate 1.36 times that of other children ($p < 0.001$). The hazard rate of maltreatment among children born with a neonatal CCC was 2.0 times that of children born without a neonatal CCC ($p < 0.001$).

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 8

Accounting for the child's time-varying temporal proximity to the soldier's deployment and adjusting for time-invariant soldier and child characteristics, hazard rate of maltreatment was 1.67 times higher in the six months immediately following a soldier's return from deployment, relative to the referent period of seven or more months prior to a deployment ($p<0.001$). Additionally, during a soldier's deployment, the hazard rate was 1.31 times greater than during the referent period ($p=0.03$).

In an additional model, an interaction term between deployment time period and a soldier's mental health identification prior to birth identified hazard ratios of different magnitudes by time period. For those with a prior mental health diagnosis or prescription, the hazard rate in the six months after deployment was 1.99 times higher than in the referent period ($p=0.005$) (Table 1). This compares to a post-deployment hazard ratio of 1.49 among those with no prior mental health indicators ($p=0.02$).

The referenced table (Table 1) is included in a manuscript draft being prepared to peer review.

2. Mental Health

When analyzing patterns of first identification of mental health conditions relative to the deployment period, we found that identification generally doubled across all mental health categories following deployment. Our descriptive findings showed that Adjustment/Acute Stress and Mood Disorders were among the most prevalent diagnoses. Female soldiers had more acute/anxiety disorders pre-deployment compared to male soldiers, and not surprisingly, more men were identified with alcohol/substance use disorders. Nearly 97% of all new PTSD diagnoses in this soldier cohort were identified post-deployment (Table 2). The average time from end of deployment to PTSD diagnoses was 309 days. Most recent analyses reveal that risk factors for PTSD in the post-deployment period include, but are not limited to, pre-deployment family stress, co-morbid mental health diagnoses, or prescription use- particularly psychostimulants, sleep medications.

Additional analyses are being performed to unpack all diagnoses patterns and interactions in our dataset. We are currently drafting two (2) manuscripts unpacking this information.

3. Child Maltreatment Reporting

Our revised analysis confirmed early findings: only 20% of medically diagnosed child maltreatment events, as identified by ICD-9 codes in child medical claims (direct and purchased care), linked to a substantiated FAP report. Revisions to the pre-existing manuscript are being made for peer review.

4. Child Maltreatment and the Deployment Cycle

The event history analysis for child maltreatment events as they relate to soldier deployment, following children from birth to 24 months was accepted to and published in the American Journal of Public Health. The paper was released online in November 2015.

Supporting Data:

Table 1. Interaction of soldier and child characteristics with deployment time periods

Deployment Period	HR	p-value	HR	p-value
	Male Soldiers		Female Soldiers	
Post-deploy	0.95	0.68	1.08	0.79

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 9

Soldier gender	7+				
Post-deploy 6	1.76	<.0001	1.17	0.73	
Deploy	1.31	0.03	0.56	0.20	
Predeploy 6	0.93	0.64	1.83	0.05	
Predeploy 7+	-	-	-	-	
		DX or RX prior to birth	No DX or RX prior to birth		
Soldier mental health DX or RX prior to birth	Post-deploy 7+	1.09	0.59	0.78	0.17
Post-deploy 6	1.99	<.0001	1.49	0.02	
Deploy	1.28	0.18	1.21	0.19	
Predeploy 6	1.43	0.08	0.82	0.33	
Predeploy 7+	-	-	-	-	

Table 2. First identification of mental health diagnoses among soldiers deployed once, by deployment time period.

Mental Health Diagnoses	Overall Rate of Identification (% of 159,452 soldiers ^a)	First Identification in Pre-Deployment Period, %	First Identification in Post-Deployment Period, %
Any mental health diagnosis	42.0	21.0	18.7
Adjustment and acute stress disorders	14.4	5.5	8.1
Mood disorder	8.6	3.1	5.2
Alcohol/substance use disorders	7.4	3.7	3.5
Anxiety disorder	6.5	1.8	4.1
Post-traumatic stress disorder	5.0	0.3	4.5
Personality disorder	1.5	0.5	0.9
Sleep disorder	0.5	0.1	0.4

^a 159,452 soldiers includes only soldiers who enlisted during the study period (2001-2007) and were deployed at total of one time during their observation period.

SECTION IV – CHANGES/PROBLEM AREAS

- (a) A description of current and recent problems that may impede performance along with actions being taken to resolve them:

We have recently submitted another 6-month NCE for time to conduct and complete completion the remaining analysis and writing. We are currently drafting four additional manuscripts.

- (b) A description of anticipated problems that have a potential to impede progress and what corrective action is planned should the problem materialize:

None.

Section V- PRODUCTS

Publications, Abstracts, and Presentations

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 10

Lay Press

Child Abuse Rises in Connection with Soldiers' Deployment

- <http://www.usatoday.com/story/news/nation/2015/11/12/study-shows-more-child-abuse-homes-returning-vets/75637992/>
- <http://www.militarytimes.com/story/military/2015/11/12/study-finds-more-child-abuse-in-homes-of-returning-vets/75675584/>

Peer-Reviewed Scientific Journals

November 2015

Taylor, C. M., Ross, M. E., Wood, J. N., Griffis, H. M., Harb, G. C., Mi, L. Song, L, Strane, D., Lynch, K.G., & Rubin, D. M. (2016). Differential child maltreatment risk across deployment periods of US Army soldiers. American journal of public health, 106(1), 153-158.

Abstracts and Presentations

January 2016

DoD Family Advocacy Program Quarterly Managers Meeting. Mark Center, Alexandria, VA.

August 2015

Psychiatric Diagnoses in U.S. Soldiers: The Identification of Mental Health Problems Relative to Soldier Deployments. Harb GC, Taylor CM, Griffis HM, Ross R, Lynch KG, Rubin DM. *Presented at:* Military Health Research Symposium

June 2015

*Protecting Our Nation's Military Children: Reporting of Child Abuse and The Direction of Future Policy. Taylor CM, Wilson L. *Presented at:* One Child, Many Hands: A Multi-disciplinary Conference on Child Welfare at The Field Center for Children's Policy, Practice, and Research; Philadelphia, PA.

April 2015

Underreporting of Physical Abuse Among Children of Army Soldiers to the U.S. Army Family Advocacy Program. Taylor CM, Wood JN, Griffis HM, Frioux SM, Lynch KG, Rubin DM. *Presented at:* Pediatric Academic Society 2015, San Diego, CA.

SECTION VI - DESCRIPTION OF WORK TO BE PERFORMED DURING THE NEXT REPORTING PERIOD.

Final Year (from Revised SOW, 2015)	Status
Prepare summary report of findings (Y4Q1-Y4Q4)	In process; Four (4) manuscripts in process.
Prepare written progress reports as required by funder	Ongoing

SECTION VII- REFERENCES

Taylor, C. M., Ross, M. E., Wood, J. N., Griffis, H. M., Harb, G. C., Mi, L. Song, L, Strane, D., Lynch, K.G., & Rubin, D. M. (2016). Differential child maltreatment risk across deployment

Title: The Temporal Relationship Between Intrafamilial Violence, Deployment, and Serious Mental Illness in US Army Service Members

PI: Rubin, David M.

Report: Annual Report #4, Year 5-6, March 18th, 2016

Page 11

periods of US Army soldiers. American journal of public health, 106(1), 153-158.

CDMRP Contacts:

Email: lance.l.nowell.civ@mail.mil

Email: brigit.m.ciccarello.ctr@mail.mil